

## CLAIMS

Sub a1  
1. A method for compressing an indexed color image on a computer, the method comprising:

identifying a pixel color for a pixel;

5 identifying a left neighbor color for a left neighbor of the pixel;

identifying an upper neighbor color for an upper neighbor of the pixel;

comparing the pixel color with the left neighbor color and the upper neighbor color;

encoding the pixel color based on the comparison using a probability model; and

10 updating the probability model.

2. A method according to claim 1, the method further comprising encoding the left neighbor color for the left neighbor of the pixel and the upper neighbor color for the upper neighbor of the pixel according to the probability model.

15 3. A method according to claim 1, wherein updating the model includes changing a probability value regarding the relationship between the pixel color and the left neighbor color and the upper neighbor color.

20 4. A method according to claim 1, wherein encoding the pixel color includes encoding the pixel color based on the comparison using a probability value in the probability model regarding the relationship between the pixel color and the left neighbor color and the upper neighbor color.

25 5. A method according to claim 4, wherein encoding the pixel color further includes selecting one of a plurality of probability values in the probability model regarding the relationship between the pixel color and the left neighbor color and the upper neighbor color.

30 6. A method according to claim 4, wherein encoding the pixel color further includes selecting an index from a color palette according to the results of comparing the pixel color to the left neighbor color and the upper neighbor color.

7. A method according to claim 6, wherein encoding the pixel color further includes compressing the selected index from the color palette.

8. A method according to claim 4, encoding the pixel color wherein encoding the pixel color includes encoding the probability value.

9. A method according to claim 1, the method further comprising selecting the probability model from a probability set.

10. A method for compressing an indexed color image on a computer, the method comprising:

detecting a background color of the image;

selecting a part of the image that includes a color other than the background color;

and

compressing the selected part of the image.

11. A method according to claim 10, wherein compressing the selected part of the image includes:

locating at least one block in the image that includes a pixel with a color other than the background color; and

compressing each block separately.

12. A method according to claim 10, wherein compressing the selected part of the image includes storing a location, a size, and a color for the part of the image when the part of the image includes pixels with only a single color.

13. A method according to claim 10, wherein compressing the selected part of the image includes:

dividing the image into at least two tessellations of blocks, each tessellation of blocks including at least one block, wherein each block includes at least one pixel with a color other than the background color and each pixel in the image with a color other than the background color is included in exactly one block in each tessellation;

estimating a size for each tessellation, wherein each block in each tessellation is compressed separately;

selecting a tessellation with a smallest estimated size; and  
compressing each block in the selected tessellation separately.

14. A method according to claim 13, wherein:

compressing the selected part of the image further includes:

computing a distance frame between a first frame and a second frame of the image;

dividing the distance frame into at least two tessellations of blocks, each tessellation of blocks including at least one block, wherein each block includes at least one pixel with a color other than the background color and each pixel in the distance frame with a color other than the background color is included in exactly one block in each tessellation; and

estimating a size for each tessellation of the distance frame, wherein each block in each tessellation is compressed separately; and

selecting a tessellation includes selecting a tessellation from the tessellations of the image and the tessellations of the distance frame with a smallest estimated size.

15. A method for decompressing an indexed color image on a computer, the method comprising:

decoding a probability value for a compressed color for a pixel;

determining whether the probability value represents the same color as a left neighbor color for a left neighbor of the pixel or an upper neighbor color for an upper neighbor of the pixel using a probability model;

decoding an uncompressed color for the pixel; and  
updating the probability model.

16. A method according to claim 15, wherein updating the model includes changing the probability value in the probability model regarding the relationship between the compressed color and the left neighbor color and the upper neighbor color.

17. A method according to claim 15, wherein determining whether the probability value represents the same color includes using the probability value in the probability model regarding the relationship between the compressed color and the left neighbor color and the upper neighbor color.

18. A method according to claim 17, wherein using the probability value includes selecting one of a plurality of probability values regarding the relationship between the compressed color and the left neighbor color and the upper neighbor color.

19. A method according to claim 15, wherein decoding an uncompressed color includes selecting an index from a color palette according to whether the compressed color represents the same color as the left neighbor color or the upper neighbor color.

20. A method according to claim 19, wherein selecting an index from a color palette includes decoding the selected index when the compressed color is determined to be different from the left neighbor color and the upper neighbor color.

21. A method according to claim 15, wherein using a probability model includes selecting the probability model from a probability set.

22. A computer-readable medium containing a program to compress an indexed color image on a computer, the program comprising:

- identification software to identify a pixel color for a pixel;
- identification software to identify a left neighbor color for a left neighbor of the pixel;
- identification software to identify an upper neighbor color for an upper neighbor of the pixel;
- comparison software to compare the pixel color with the left neighbor color and the upper neighbor color;
- encoding software to encode the pixel color based on the comparison using a probability model; and
- updating software to update the probability model.

23. A computer-readable medium containing a program according to claim 22, wherein the updating software includes changing software to change a probability value regarding the relationship between the pixel color and the left neighbor color and the upper neighbor color.

24. A computer-readable medium containing a program according to claim 22, wherein the encoding software includes selection software to select one of a plurality of probability values in the probability model regarding the relationship between the pixel color and the left neighbor color and the upper neighbor color.

25. A computer-readable medium containing a program according to claim 22, the program designed to store the compressed indexed color image in a data structure in memory, the data structure including:  
dimensions for the image;  
a color palette for the image;  
a background color of the image; and  
at least one compressed block, the compressed block including a location for the block, dimensions for the block, and at least one pixel compressed using a dynamic probability model.

26. A computer-readable medium containing a program according to claim 22, the program further comprising selection software to select the probability model from a probability set.

27. A computer-readable medium containing a program to compress an indexed color image on a computer, the program comprising:  
detection software to detect a background color of the image;  
selection software to select a part of the image that includes a color other than the background color; and  
compression software to compress the selected part of the image.

28. A computer-readable medium containing a program according to claim 27 wherein the compression software includes:

division software to divide the image into at least two tessellations of blocks, each tessellation of blocks including at least one block, wherein each block in each tessellation includes at least one pixel with a color other than the background color and each pixel in the image with a color other than the background color is included in exactly one block in each tessellation;

estimation software to estimate a size for each tessellation, wherein each block in each tessellation is compressed separately;

selection software to select a tessellation with a smallest estimated size; and  
compression software to compress each block in the selected tessellation separately.

29. A computer-readable medium containing a program according to claim 28, wherein:

the compression software further includes:

distance computing software to compute a distance frame between a first frame and a second frame of the image;

division software to divide the distance frame into at least two tessellations of blocks, each tessellation of blocks including at least one block, wherein each block in each tessellation includes at least one pixel with a color other than the background color and each pixel in the distance frame with a color other than the background color is included in exactly one block in each tessellation; and

estimation software to estimate a size for each tessellation of the distance frame, wherein each block in each tessellation is compressed separately; and

the selection software includes selection software to select a tessellation from the tessellations of the image and the tessellations of the distance frame with a smallest estimated size.

30. A computer-readable medium containing a program according to claim 27, the program designed to store the compressed indexed color image including at least two frames in a data structure in memory, the data structure including:

dimensions for the image;  
a color palette for the image;  
a background color of the image;

at least one compressed block, the compressed block including a location for the block, dimensions for the block, and at least one pixel compressed using a dynamic probability model; and

a frame marker indicating whether or not one of the frames is a distance frame.

31. A computer-readable medium containing a program to decompress an indexed color image on a computer, the program comprising:

decoding software to decode a probability value for a compressed color for a pixel;

determination software to determine whether the probability value represents the same color as a left neighbor color for a left neighbor of the pixel or an upper neighbor color for an upper neighbor of the pixel using a probability model;

decoding software to decode an uncompressed color for the pixel; and

updating software to update the probability model.

32. A computer-readable medium containing a program according to claim 31, wherein the updating software includes changing software to change the probability value in the probability model regarding the relationship between the compressed color and the left neighbor color and the upper neighbor color.

33. A computer-readable medium containing a program according to claim 31, wherein the determination software includes modeling software operable in accordance with the probability model to use the probability value in the probability model regarding the relationship between the compressed color and the left neighbor color and the upper neighbor color.

34. A computer-readable medium containing a program according to claim 31, wherein the decoding software includes selection software to select an index from a color palette according to whether the compressed color represents the same color as the left neighbor color or the upper neighbor color.

35. A computer-readable medium containing a program according to claim 34, wherein the selection software includes decoding software to decode the selected index when

the compressed color is determined to be different from the left neighbor color and the upper neighbor color.

36. An apparatus comprising:

5 a computer including a processor and a memory;

an indexed color image loaded in the memory of the computer;

a color palette specifying colors in the image;

a probability model predicting a probability value of a color of a pixel given a color of a left neighbor of the pixel and a color of an upper neighbor of the pixel;

10 an update module designed to update the probability value in the probability model given the color of the pixel, the color of the left neighbor of the pixel, and the color of the upper neighbor of the pixel; and

an compressor designed to compress the color of the pixel using the color palette.

37. An apparatus according to claim 36, wherein:

15 the image includes a first frame and a second frame; and

the apparatus further comprises a distance frame generator for generating a distance frame between the first and second frames of the image.

38. An apparatus according to claim 36, wherein:

20 the image includes a background color; and

the apparatus further comprising a block locator for locating a block in the image, the block including at least one pixel with a color other than the background color.

39. An apparatus according to claim 36 the apparatus further comprising a size estimator designed to estimate the size of the compressed image using a division of the image.

40. An apparatus according to claim 39, the apparatus further comprising selection means to select a division of the image based on the estimated size of a plurality of divisions of the image.



41. An apparatus according to claim 40, wherein the selection means is further designed to select the division of the image based on the estimated size of the plurality of divisions of the image and the estimated size of a plurality of divisions of a distance frame between a first frame and a second frame of the image.

42. An apparatus according to claim 36, the apparatus further comprising decompression means for decompressing a compressed image compressed on the computer.

43. An apparatus according to claim 42, wherein:  
the decompression means are operable on a second computer; and  
the apparatus further comprises transmission means for transmitting the compressed image from the computer to the second computer.

44. An apparatus according to claim 36, the apparatus further comprising selection means to select the probability model from a probability set including a plurality of probability models.

45. A memory for storing a compressed image file, comprising:  
a data structure stored in said memory, said data structure including:  
dimensions for the image;  
a color palette for the image;  
a background color of the image; and  
at least one compressed block, the compressed block including a location for the block, dimensions for the block, and at least one pixel compressed using a dynamic probability model.

46. A memory according to claim 45, wherein:  
the image includes at least two frames; and  
the data structure further includes a frame marker indicating whether or not one of the frames is a distance frame.